

10/562330

LISTING OF CLAIMS

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Please replace pages 23-28 of the original English translation submitted herewith with substitute sheets 23-28 attached hereto, which include a Listing of Claims incorporating Annexes under PCT Article 36. Please amend the claims on substitute sheets 23-28 as follows. Original Claims 26-28 were canceled in the Annexes.

On new page 23, line 1, please delete the current heading "CLAIMS" and insert the following new heading:

--What is claimed is:--.

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently Amended) An optical security element (1) having a substrate layer (14), wherein a relief structure (17) defined by relief parameters is shaped in a surface region (21, 27, 33, 4, 50, 7, 65) of the substrate layer, which region is defined by an X-axis and a Y-axis, for producing an optically perceptible effect,

wherein characterised in that

one or more of the relief parameters defining the relief structure in the surface region (21, 27, 33, 4, 50, 7, 65) are varied periodically in accordance with a periodic parameter variation function, that wherein the surface region (21, 27, 33, 4, 50, 7, 65) is divided into one or more pattern regions (23, 30, 29, 35, 502, 74, 66) and a background region (22, 28, 34, 501, 73, 66), that and wherein one or more of the relief parameters defining the relief structure relief shape, relief depth, spatial frequency and azimuth angle in the background region (22, 28, 34, 501, 73, 66) and the one or more pattern regions (23, 30, 29, 35, 502, 74, 67) are varied periodically in accordance with a periodic parameter variation function (54, 54, 55), wherein the relief structure is a diffraction grating and the period of the parameter variation function is between 20 μm and 300 μm , and that the one or more of the relief parameters defining the relief structure (17), relief shape, relief depth, spatial frequency and

azimuth angle in the one or more pattern regions (~~23, 29, 30, 35, 502, 74, 67~~) are varied in accordance with a parameter variation function which is phase-displaced with respect to the parameter variation function of the background region (~~22, 28, 34, 501, 73, 66~~).

2. (Currently Amended) An optical security element according to claim 1 ~~characterised in that~~, wherein the phase displacement of the parameter variation function between the pattern region and the background region is about 180 degrees.

3. (Currently Amended) An optical security element according to claim 1, ~~wherein one of the preceding claims characterised in that~~ the phase displacement of the parameter variation function between the pattern region and the background region is selected in accordance with the contrast to be set.

4. (Currently Amended) An optical security element according to claim 1, ~~wherein one of the preceding claims characterised in that~~ the relief structure is a diffraction grating whose azimuth angle is varied periodically in accordance with the parameter variation function.

5. (Currently Amended) An optical security element according to claim 4, wherein ~~characterised in that~~ the mean azimuth angle in relation to the resolution capacity of the human eye is constant.

6. (Currently Amended) An optical security element according to claim 4, ~~wherein one of claims 4 and 5 characterised in that~~ the parameter variation varies the azimuth angle of the diffraction grating (~~28, 33~~) periodically in dependence on the value of the X-axis.

7. (Currently Amended) An optical security element according to claim 6, wherein ~~characterised in that~~ the parameter variation function varies the azimuth angle of the diffraction grating (~~28~~) in such a way that the diffraction grating is composed of a plurality of serpentine line-shaped lines.

8. (Currently Amended) An optical security element according to claim 7, wherein ~~characterised in that~~ the parameter variation function is a sine function which varies the azimuth angle of the diffraction grating (~~28~~) in dependence on the value of the X-axis.

9. (Currently Amended) An optical security element according to claim 4, ~~wherein one of claims 4 to 6 characterised in that~~ the parameter variation function varies the azimuth angle of the diffraction grating (4) periodically in dependence on the value of the X-axis and the value of the Y-axis.

10. (Currently Amended) An optical security element according to claim 9, ~~wherein characterised in that~~ the parameter variation function varies the azimuth angle of the diffraction grating in such a way that the diffraction grating (4) is composed of a plurality of lines arranged in concentric circles.

11. (Currently Amended) An optical security element according to claim 4, ~~wherein one of claims 4 to 10 characterised in that~~ the diffraction grating has a spatial frequency of more than 300 lines per mm, in particular a spatial frequency of 800 to 1200 lines per mm.

12. (Currently Amended) An optical security element according to claim 1, ~~wherein one of the preceding claims characterised in that~~ the relief structure (17) is a diffraction grating (50) whose spatial frequency is varied periodically in accordance with the parameter variation function (53, 54, 55).

13. (Currently Amended) An optical security element according to claim 12, ~~wherein characterised in that~~ the mean spatial frequency in relation to the resolution capacity of the human eye is constant.

14. (Currently Amended) An optical security element according to claim 12, ~~wherein or claim 13 characterised in that~~ the parameter variation function (53, 54, 55) varies the spatial frequency (50) periodically between a maximum frequency, preferably 1200 lines per mm, and a minimum frequency, preferably 800 lines per mm, in dependence on the value of the X-axis.

15. (Currently Amended) An optical security element according to claim 14, ~~wherein characterised in that~~ the parameter variation function is a sawtooth function (53), a triangular function (54) or a sine function (55).

16. (Currently Amended) An optical security element according to claim 1, ~~wherein one of the preceding claims characterised in that~~ the relief structure (17) is a

diffraction grating (61) whose profile depth is varied periodically in accordance with the parameter variation function.

17. (Currently Amended) An optical security element according to claim 16, wherein ~~characterised in that~~ the parameter variation function varies the profile depth of the diffraction grating (61) periodically between a maximum depth, preferably 300 nm, and a minimum depth, preferably 50 nm, in dependence on the value of the X-axis.

18. (Currently Amended) An optical security element according to claim 16, wherein ~~one of claims 16 and 17 characterised in that~~ the parameter variation function is a triangular, rectangular or sine function.

19. (Currently Amended) An optical security element according to claim 1, wherein ~~one of the preceding claims characterised in that~~ the relief shape (75, 76) is varied periodically in accordance with the parameter variation function.

20. (Currently Amended) An optical security element according to claim 19, wherein ~~characterised in that~~ the relief shape is varied periodically between two asymmetrical, mutually mirror-symmetrical relief shapes (75, 76).

21. (Currently Amended) An optical security element according to claim 1, wherein ~~one of the preceding claims characterised in that~~ the width of the troughs of the relief structure is varied periodically in accordance with the parameter variation function.

22. (Currently Amended) An optical security element according to claim 1, wherein ~~one of the preceding claims characterised in that~~ the mean azimuth angle of the relief structure (17) respectively corresponds to the azimuth angle of an associated verification grating (101 to 106).

23. (Currently Amended) An optical security element according to claim 1, wherein ~~one of the preceding claims characterised in that~~ the phase displacement between the background region and the pattern region is accompanied by a further function change.

24. (Currently Amended) A system for visualising items of concealed information comprising a security element (1) having a substrate layer (14) in which a relief structure (17) defined by relief parameters is shaped in a surface region (21, 27, 33, 4, 50, 7, 65) of the substrate layer (14), which region is defined by an X-axis and a Y-axis, for

producing an optically perceptible effect,

wherein characterised in that

one or more of the relief parameters defining the relief structure in the surface region (~~21, 27, 33, 4, 50, 7, 65~~) are varied periodically in accordance with a periodic parameter variation function, ~~that~~ wherein the surface region (~~21, 27, 33, 4, 50, 7, 65~~) is divided into one or more pattern regions (~~23, 30, 29, 35, 502, 74, 66~~) and a background region (~~22, 28, 34, 501, 73, 66~~), ~~that~~ wherein one or more of the relief parameters defining the relief structure relief shape, relief depth, spatial frequency and azimuth angle in the background region (~~22, 28, 34, 501, 73, 66~~) and the one or more pattern regions (~~23, 30, 29, 35, 502, 74, 67~~) are varied periodically in accordance with a periodic parameter variation function (~~54, 54, 55~~), wherein the relief structure is a diffraction grating and the period of the parameter variation function is between 20 μm and 300 μm , ~~that~~ wherein the one or more of the relief parameters defining the relief structure (~~17~~) relief shape, relief depth, spatial frequency and azimuth angle in the one or more pattern regions (~~23, 29, 30, 35, 502, 74, 67~~) are varied in accordance with a parameter variation function which is phase-displaced with respect to the parameter variation function of the background region (~~22, 28, 34, 501, 73, 66~~), and ~~that~~ wherein the system further has a verification element (~~20, 57, 101~~) which has a verification grating which is defined by a periodic transmission function and whose period corresponds to the period of the parameter variation function.

25. (Currently Amended) A system according to claim 24, wherein characterised ~~in that~~ the transmission function is a non-binary transmission function, in particular a sine function.